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function Hd = getFilter
%GETFILTER Returns a discrete-time filter object.

% MATLAB Code
% Generated by MATLAB(R) 9.9 and DSP System Toolbox 9.11.
% Generated on: 17-Oct-2020 23:29:41

Fpass = 600; % Passband Frequency
Fstop = 700; % Stopband Frequency
Apass = 1; % Passband Ripple (dB)
Astop = 80; % Stopband Attenuation (dB)
Fs = 2000; % Sampling Frequency

h = fdesign.lowpass('fp,fst,ap,ast', Fpass, Fstop, Apass, Astop, Fs);

Hd = design(h, 'equiripple', ...
    'MinOrder', 'any', ...
    'StopbandShape', 'flat');

set(Hd, 'Arithmetic', 'fixed', ...
    'InputWordLength', 16, ...
    'InputFracLength', 15, ...
    'CoeffWordLength', 24, ...
    'CoeffAutoScale', true, ...
    'FilterInternals', 'Fullprecision');

%General filter characteristics
measure(Hd)

%Enquire about the filter structure & it's properties
info(Hd)

%Estimate computational complexity of the filter
cost(Hd)

%Use fvtool to visualize the frequency response plot
fvtool(Hd);

```

ans =

```

Sample Rate      : 2 kHz
Passband Edge    : 600 Hz
3-dB Point       : 616.3011 Hz
6-dB Point       : 628.1421 Hz
Stopband Edge    : 700 Hz
Passband Ripple  : 0.96726 dB
Stopband Atten.  : 80.0904 dB
Transition Width  : 100 Hz

```

Discrete-Time FIR Filter (real)

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Filter Structure : Direct-Form FIR
Filter Length    : 51
Stable           : Yes
Linear Phase     : Yes (Type 1)
Arithmetic       : fixed
Numerator        : s24,23 -> [-1 1]
Input            : s16,15 -> [-1 1]
Filter Internals : Full Precision
  Output         : s41,38 -> [-4 4] (auto determined)
  Product        : s39,38 -> [-1 1] (auto determined)
  Accumulator    : s41,38 -> [-4 4] (auto determined)
  Round Mode     : No rounding
  Overflow Mode  : No overflow

```

ans =

```

Number of Multipliers : 51
Number of Adders      : 50
Number of States      : 50
Multiplications per Input Sample : 51
Additions per Input Sample : 50

```

ans =

```

FilterStructure: 'Direct-Form FIR'
Arithmetic: 'fixed'
Numerator: [1x51 double]
PersistentMemory: false

CoeffWordLength: 24
CoeffAutoScale: true
Signed: true

InputWordLength: 16
InputFracLength: 15

FilterInternals: 'FullPrecision'

```

